

CURRICULUM VITAE

I. Personal data

Name: RAUL ALBERTO BARREA

Date of birth: July 2nd, 1962.

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II. Education

Licenciate in Physics (equivalent to a MS degree) – National University of Córdoba, Argentina - 1988.

Doctorate in Physics – National University of Córdoba, Argentina - 1995.

III. Fellowships granted

Ph. D. fellowship – Research Council of Cordoba State (CONICOR), Argentina.
Period 1991/94

Posdoctoral fellowship – National Research Council of the Brazilian Government (CNPq) and Latin

American Center of Physics (CLAF), Period 1999/2000.

IV. Current Position

Associate Director, Biophysics Collaborative Access Team- Oct 2004 – current.
Assistant Research Professor in Physiscs, Illinois Institute of Technology- April 2004 – current.

Responsible for the XAS and microprobe program at the BioCAT 18ID beamline.

V. Previous positions

1. **Senior Reseach Associate**, BioCAT, IIT, Jan 2002-April 2004. I joined BioCAT in January 2002 mainly to start building the XAFS users program. After the beamline was constructed and commissioned, the need for a scientific program was the focus of BioCAT activity and our XAFS community was not complete developed at that time. During the first two years I focused my efforts in developing a reliable scientific

program for our users. My duties were as the responsible for the XAS and microprobe program of the 18ID BioCAT beamline. At the sametime I maintained collaborations with groups from my institution of origin and some publications are resulted from them.

2. **Assistant Professor of Physics**, National University of Cordoba (UNCba) (1999-2002). During 1999 the national government increased the National Universities budget allowing most of them to incorporate more professors in varios levels. The position was offered temporarily (2 years term). I was selected among 35 candidates as an Assistant Professor in Physics. In 2001 the position was offered as a permanent Assistant Professor. I was awarded with the position to perform x-ray synchrotron radiation studies in biological samples and atomic physics in rare earth compounds.
3. **Visitant Researcher**, CNPQ (Aug 2000 – Feb 2001). The National Council for the Scientific and technologic development (CNPq) of Brazil funded this position after 1 ½ years of posdoc. The head of the Spectroscopy Group Dr. Helio Tolentino The project involved the continuation of the posdoctoral project plus collaborations with other groups that were new in the XAFS technique for biological samples. The short stay resulted in congress presentations and journal publications.
4. **Posdoctoral fellow**, CLAF – CNPq (Feb 1999- Aug 2000). The Latin American Center of Physics (CLAF) and the CNPq funded this Posdoc position. The position was opened to allow non Brazilian young scientist to perform a 1 ½ year project at the Brasilian synchrotron Radiation facility (LNLS). The project involved biological XAFS, instrumentation and users service. No biological XAS had been performed at the LNLS before. In this position I pioneer the XAFS studies of very dilute samples at the LNLS. A custom designed 15 elements Camberra germanium detector was acquired based in the results obtained. Other X-ray fluorescene projet were performed and many publications resulted from them.
5. **Teaching Assistant**, National University of Cordoba (UNCba) (1990-1999). This position is usually offered to graduate student to allow performing their PhD studies while building their teaching experience. After I finished my PhD projet there were no professor positions available at any Colleges in Argentina due to budget reduction and political situation. The teaching assistant position was maintained while duties of an assistant professor were performed.
6. **PhD fellow**, CONICOR (March 1991- February 1994). The Research Council of Cordoba State awarded this fellow position for PhD studies. The award is offered after a contest among several candidates considering the following: project proposal and student cv. The project involved the development of methods and techniques of elemental compositional determination of stainless-steal samples by absolute x-ray fluorescence analysis. The use of standards is often too expensive and sometimes there are no standards available for certain samples. The use of internal standards and the excitation with several photon energies permit the determination of the samples'composition without any standards. The project resulted in several publications.
7. **Assistant Research Associate**, INVAP S.E. (1988-1989).. After I graduate from FAMAF I joined the INVAP (Applied research by their spanish nomenclature) at the Special devices development Group. INVAP is the largest andmost important technology

companies in Argentina that builds Nuclear Power Reactors and Plants for Research activities. My previous experience in x-ray detectors was considered essential for this position. My duties were the development of gas flow radiation detector for dosimetry and contamination control and monitoring. I left INVAP a year later to continue with my graduate studies at the FAMAF.

8. **Student Teaching Assistant**, National University of Cordoba (UNCba) (1987). Funded by the National University of Córdoba. This position is offered to last year undergraduate students with high grades to assist professors in teaching activities, especially in laboratory lectures.

VI. Fields of interest

- 1 Molecular and Atomic Physics, information about atoms and molecules obtained experimentally; Instrumentation and techniques.
- 2 General physics, x-ray instrumentation, synchrotron instrumentation.
- 3 Atomic and molecular physics, applications in biology.
- 4 Synchrotron radiation applications in physics and biology.

VII. Ph. D. Thesis

"Development of methods and procedures for absolute x-ray fluorescence analysis", (1995), School of Mathematics, Astronomy and Physics – National University of Cordoba - Argentina.

VIII. CATEGORIZATION PROGRAM FOR UNIVERSITY INVESTIGATORS OF THE NATIONAL SECRETARY OF UNIVERSITY AFFAIRS

This program was implemented back in 1994 to categorize professors and teaching assistants of all national universities into research categories according with their dedication and performance in their research field. The categories were originally A, B, C and D (being A the highest) and later changed for 5 categories: I, II, III, IV and V (being I the highest). The categories are reviewed every three years. More information can be found at <http://incentivos.spu.edu.ar/> (site in spanish only).

Investigator class III – since 1999 until 2002

Investigator class C – since 1994 until 1999.

IX. AWARDS

1994 Teaching Award – National University of Córdoba.

X. TEACHING EXPERIENCE

1. Student teaching assistant - UNCba

General Physics II (200 level)	1st Semester - 1987
General Physics III (200 level)	2nd Semester - 1987

2. Teaching Assistant - UNCba

General Physics I	(100 level)	2nd Semester - 1989
Modern Physics II	(300 level)	1st Semester - 1990
General Physics III*	(200 level)	2nd Semester- 1990
Modern Physics II	(300 level)	1st Semester - 1991
General Physics I	(100 level)	2nd Semester - 1991
Introd. To Physics	(100 level)	1st Semester - 1992
Special Course III	(500 level)	2nd Semester - 1992
General Physics II	(200 level)	1st Semester -1993
Special Course III	(500 level)	2nd Semester - 1993
General Physics I*	(100 level)	1st Semester - 1994
Special Course III	(500 level)	2nd Semester- 1994
Genral Physics I*	(100 level)	1st Semester - 1995
Physics Laboratory II*	(200 level)	2nd Semester- 1995
Physics Laboratory I*	(200 level)	1st Semester - 1996
Physics Laboratory II*	(200 level)	2nd Semester- 1996
Modern Physics II	(300 level)	1st Semester- 1997
Physics Laboratory II*	(200 level)	2nd Semester- 1997
Physics Laboratory I*	(200 level)	1st Semester - 1998
Physics Laboratory II*	(200 level)	2nd Semester- 1998

5. Assistant Professor of Physics - UNCba.

Genral Physics II	(200 level)	1st Semester – 1999
Physics Laboratory I*	(200 level)	1st Semester - 2001
Physics Laboratory II*	(200 level)	2nd Semester - 2001

All these activities were performed at the School of Mathematics, Astronomy and Physics of the National University of Córdoba.

(*) These activities were performed at the School of Chemistry of the National University of Córdoba.

Lecturer of the posgraduate course "Methodology and applications of radioisotopes". Organized jointly by the FAMAF, FCQ and FCEFNC of the National University of Córdoba. 1993 –1997.

XI. STUDENT PROJECT ACTIVITIES**Undergraduate Research Project**

1. Tomás S. Plivelic (1995) "Determination of absorption edges for rare earth elements".
2. Silvina Bengió (1996) "Determination of compositon and thickness of thin films by x-ray fluorescence".

3. Silvina Bengió (1996) "Interaction of UV radiation with matter: properties and biological effects".

XII. ACTIVITIES AS JOURNAL REFEREE AND BEAMLINE ADVISOR

1. National Synchrotron Light Laboratory LNLS – Advisor of the XAS beamline – year 2000/2004.
2. National Synchrotron Light Laboratory LNLS – Advisor of the XRF beamline – year 2002/03.
3. X-ray Spectrometry- referee of several articles years 2001 to 2002.
4. Spectrochimica Acta Part B: Atomic spectroscopy –referee of article year 2002.
5. Spectroscopy Letters –referee of article year 2004.

XIII. Member of Thesis Committee

1. Member of Thesis Committee: student Pedro A. Derosa. UNCba. 1997.
2. Member of Thesis Committee: student Rodolfo Figueira UNCba. 2001.

XIV. SERVICE TO DEPARTMENT, COLLEGE AND UNIVERSITY

1. Counselor at the High Council of the National University of Cordoba. Period 1996/1998.
2. Coordinator of the College Space committee (2001).

XV. ORGANIZATION OF CONGRESS, SEMINARS AND MEETINGS

1. Member of the organizing committee of the V Latin American Seminar of Analysis by X-ray Techniques, SARX'96, November 19-23 1996, Cosquín, Argentina.
2. Member of the organizing committee of the V Latin American Seminar of Analysis by X-ray Techniques, SARX'98, November 16-20 1998, Huerta Grande, Argentina.
3. Member of the organizing committee of the V Latin American Seminar of Analysis by X-ray Techniques, SARX'2000, November 19- 24 2000, São Pedro, SP, Brasil.

XVI. RESEARCH PROJECTS AS PARTICIPANT

1. Project Title: "Interaction with photons, electrons and positrons with matter", Funded by the Secretary of Science and Technology of the National university of Córdoba. PI: Raúl T. Mainardi. Period 1994- 1996.
2. Project Title: "Experiments of positron annihilation in condensed matter", Funded by the: CONICOR, PI: Raúl T. Mainardi, Period 1990 - 1996.

3. Project Title: "Optimization of methods of metal concentration determinations in oils and gasolines", Funded by: Secretary of Science and Technology of the National University of Córdoba, PI: Raúl T. Mainardi, Period 1993 -1994.

4. Project Title: "Spectroscopy of emissions in interactins of photons and electrons with matter ", Funded by: CONICET, PI: Raúl T. Mainardi, Period 1993 - 1996.

5. Project Title: "Construction of a exclusive beamline for x-ray fluorescence atthe National Synchrotron Light Laboratory", Funded by FAPESP - LNLS, Campinas, SP, Brasil, PI: Maria Izabel Bueno, Period: 1996 – 1998.

6. Project Title: "Non conventional analysis by x-ray fluorescence ", Funded by: CONICET, PI: H. J. Sánchez, Period 1999-2002.

7. The Biophysics Collaborative Access Team –BioCAT. Funded by NIH, PI: Thomas Irving, P41 Grant RR08630. Period 2002-present.

AS PRINCIPAL INVESTIGATOR OR CO-PI

1. **Raul A. Barrea**, (1997-1998), "Characterization of thin films by synchrotron radiation x-ray techniques", Funded by: LNLS, Campinas, SP, Brasil and CONICOR, \$ 2,000.

2. **Raul A Barrea** (1997-1998), "Determination of Experimental fluorescence cross-sections", funded by: LNLS, Campinas, SP, Brasil and CONICOR, \$ 2,000.

3. **Raul A. Barrea** (1999-2000), "Determination of M shell experimental fluorescence cross sections of heavy elements by synchrotron radiation techniques", Funded by: LNLS, Campinas, SP, Brasil and CONICOR, \$2,000.00.

4. **Raul A. Barrea** (1999-2000), "Determination of L shell fluorescence cross-section by synchrotron radiation techniques", Funded by: LNLS, Campinas, SP, Brasil and SeCyT, \$2,500.

5. **Raul A Barrea** (1999-2000), “Studies of the metal adsorption in human dental calculus by X-ray absorption spectroscopy”, Funded by: LNLS, Campinas, SP, Brasil and CLAF, \$5,000.

6. Hector J. Sánchez, and **Raúl A. Barrea** (1999-2000) "Non conventional analysis of trace and ultra-trace elements in biological samples by X-ray fluorescence ", Funded by CONICOR. \$ 3,000.

7. Hector J. Sánchez, and **Raúl A. Barrea** (2000-2002), "Non conventional analysis of trace and ultra-trace elements in biological samples by X-ray fluorescence ", Funded by SeCyT – UNC., \$5,000.
8. Hector J. Sánchez, and **Raúl A. Barrea** (2001-2002) "Non conventional analysis of trace and ultra-trace elements in biological samples by X-ray fluorescence", funded by CORDOBA SCIENCE AGENCY. \$ 1000.
9. **Raul A. Barrea** (2000-2002), "Studies of the angular distribution of L shell emissions", funded by: LNLS, Campinas, SP, Brasil, and SECYT, \$2,000.

XVII. INVITED TALKS AT SCIENTIFIC MEETINGS

1. **R. A. Barrea** (2000), "A brief history of the Latin American Seminars by X-Ray Techniques", Invited Conference, SARX 2000.
2. R.T. Mainardi and **R.A. Barrea** (1994), "Determinación de la emisión espectral de tubos de rayos x de anticátodo de tungsteno a partir de mediciones de intensidades fluorescentes de muestras puras", IV Seminario Latinoamericano de Técnicas de Análisis por Rayos-X SARX'94, Punta de Tralca - Chile - Octubre de 1994.
3. **R.A. Barrea** (1994), "Desarrollo de un método absoluto de análisis por fluorescencia de rayos X", IV Seminario Latinoamericano de Técnicas de análisis por Rayos-X SARX'94, Punta de Tralca - Chile - Octubre de 1994.
4. **Raúl A. Barrea**, Raúl T. Mainardi, Silvina Bengió and Pedro A. Derosa (1995), "FRX por Reflexión-Transmisión: aplicaciones en films delgados", Workshop sobre Fluorescencia de Rayos X con radiación de Sincrotrón: aplicaciones e instrumentación. Fa.M.A.F. UNCba 6 al 8 de Setiembre de 1995.
5. **Barrea, R.A.**, Perez C.A., Ramos A.Y., Tolentino H., Grenón M. and Sánchez H.J (2000), "Zn environment in subgingival Human Dental Calculus by X-Ray Absorption spectroscopy", 10a Reunión Anual de Usuarios del Laboratorio Nacional de Luz Sincrotron, Campinas Brasil - 16 al 18 de Febrero de 2000.
6. **Barrea, R.A.**, Perez C.A., Ramos A.Y., Tolentino H., Grenón M. and Sánchez H.J. (2000), "Zn environment in subgingival Human Dental Calculus by X-Ray Absorption spectroscopy", XXIII Encontro Nacional de Fisica de materia Condensada, São Lorenço, MG, Brasil, 9 al 12 de maio de 2000.
7. **R. A. Barrea**, J.A. Abraham, H, J, Sánchez, M. S. Grenon, C.A. Perez (2004), "Metal Spatial distribution and incorporation in Human Dental Calculus", Midwest Metal Meeting, June 4-6, 2004, Ann Arbor, MI.

XVIII. COLLOQUIUM TALKS

1. **Raúl A. Barrea** (2002), **Physics Colloquium** “Compositional and Structural Characterization of Human Dental Calculus,” IIT, February 7, 2002, Life Sciences.
2. **Raul A. Barrea** (2002), “Biological X-ray Absorption Spectroscopy and Non-Crystalline Diffraction at the BioCAT Beamline at the Advance Photon Source”, Lawrence Berkeley National Laboratory, Berkeley Spectroscopy Club. 09/25/02.

XIX. PUBLISHED AND ACCEPTED PAPERS IN PEER REVIEWED JOURNALS (*Electronic and hard copy versions of published and submitted manuscripts are available upon request.*)

1. R.T. Mainardi and **R.A. Barrea** (1989), "X Ray Spectral determination by successive modifications of the beam intensity", Nucl. Instrum. and Meth. in Phys. Res. A280, 387 – 391.
2. R.T. Mainardi and **R.A. Barrea** (1994), "X-Ray fluorescence analysis with elements having overlapped lines", X-Ray Spectrom., 23, 36-39.
3. R.T. Mainardi and **R.A. Barrea** (1995), "Determination of spectral emission of tungsten target tubes measuring x-ray fluorescence from pure elements", Appl. Radiat. Isot., Vol 46, No 6/7, 497-498.
4. R.T. Mainardi and **R.A. Barrea** (1996), "Indirect Method of X-Ray Spectra Determination by XRF", X-Ray Spectrom. Vol 25, 190-195.
5. **R.A. Barrea** and R.T. Mainardi (1998), "Standardless XRF Analysis of stainless steel samples", X Ray Spectrom., Vol. 27, No 2, 111-116.
6. **R. A. Barrea**, P.A. Derosa, S. Bengió and R. T. Mainardi (1998), "Thin sample thickness determination by X-Ray fluorescence Analysis", Radiat. Phys. Chem. Vol. 51, No 4-6, p673.
7. V. Delgado Martinez, R. T. Mainardi, **R. A. Barrea**, C. Martinez Hidalgo, P.A. Derosa and M. Marco Arboli (1998), "Parametric equation for the efficiency curve of germanium detectors ", X Ray Spectrometry Vol. 27, No 5, 321-324.
8. **R. A. Barrea**, S. Bengió, P. A. Derosa and R.T. Mainardi (1998), "Absolute Mass Thickness Determination of Thin Samples by X-Ray Fluorescence Analysis", Nucl. Instrum. and Meth. in Phys. Res. B , Vol 143, No 4, 561-568.

9. V. Delgado Martinez, C. Martinez Hidalgo and **R. A. Barrea**, (2000), "X-Ray Fluorescence analysis by the fundamental parameters method without explicit knowledge of the excitation beam spectrum", X-Ray Spectrometry 29,245-248.
10. **R. A. Barrea** and E. V. Bonzi (2000), "Experimental Determination of L X-Ray Fluorescence Cross-sections for rare earth at 10.7 keV", Radiat. Phys. and Chem.59 (4), 347-354.
11. **R. A. Barrea** and E. V. Bonzi (2001), "Rare Earth's Experimental L X-Ray Fluorescence Cross-sections at 13 and 14 keV with Synchrotron Radiation", X-Ray Spectrom., 30, 3-7 .
12. **R. A. Barrea** and E. V. Bonzi (2001), "L X-Ray Fluorescence Cross-sections for rare earths at 10 and 11 keV with Synchrotron Radiation", Nucl. Instrum. and Meth. in Phys. Res. B, vol No 179/1, 1-10.
13. **R. A. Barrea**, V. Delgado Martinez and T. Plivelic (2001), "Multielemental X-Ray Fluorescence analysis by using a non-explicit description of the excitation beam", X-Ray Spectrometry, 30, 93-98.
14. H. C. N. Tolentino, A. Y. Ramos, M.C.M. Alves, **R. A. Barrea**, E. Tamura, J.C. Cezar and N. Watanabe (2001), "A 2.3 to 25 KeV XAS beam line at LNLS", J. Synchrotron. Rad., 8, 1040-1046.
15. **R. A. Barrea** and E. V. Bonzi (2001),"Lanthanides's Experimental L X-Ray Fluorescence Cross-sections at 9 keV and 12 keV with Synchrotron Radiation", Physica Scripta, 63, 197-202.
16. **R. A. Barrea** and E. V. Bonzi (2001), "Hf, Ta, W and Re Experimental L X-Ray Fluorescence Cross-sections at 12, 13 and 14 keV with Synchrotron Radiation", Spectrochimica Acta Part B: Atomic Spectroscopy, 56, 2429-2437.
17. **Barrea, R.A.**, Tamura E. and Tolentino H. C. N. (2001), "A Multiwire proportional Counter for XAS Fluorescence experiments", J. Synchrotron Rad., 8, 381-383.
18. **Barrea, R.A.**, Perez C.A., Ramos A.Y (2001), "Zn incorporation in Human Dental Calculus", J. Synchrotron Rad., 8, 990-992.
19. E. V. Bonzi and **R. A. Barrea** (2002), "Measurement of L X-Ray Fluorescence Cross sections for rare earth at 15.2 keV", Radiat. Phys. and Chem., 63, 129-134.

20. Jose Abraham, M. Grenón, H. J. Sánchez, C. A Pérez, **R. A. Barrea** (2002), "Spectrochemical Analysis of Dental Calculus by Synchrotron Radiation X-Ray Fluorescence", *Anal. Chem.* 74 (2): 324-329.
21. **R. A. Barrea**, C.A. Pérez and H. J. Sánchez (2002), "Hafnium L-subshell Coster–Kronig and fluorescence yields determination by synchrotron photoionization", *Spectrochimica Acta Part B* 57 999–1008.
22. **R. A. Barrea**, C.A. Pérez and H. J. Sánchez (2002), "Erbium L-subshell Coster–Kronig and fluorescence yields determination by synchrotron radiation photoionization", *J. Phys. B: At. Mol. Opt. Phys.* **35** 3167–3178.
23. **R. A. Barrea**, C.A. Pérez and H. J. Sánchez (2003), "Determination of L-subshell Coster–Kronig and fluorescence yields of lanthanum and praseodymium by synchrotron radiation photoionization", *Spectrochimica Acta Part B* 58 51–62.
24. **R.A. Barrea**, Perez C.A., Ramos A.Y., Grenón M. and Sánchez H.J (2003), "Distribution and incorporation of Zn in biological calcium phosphates", *X-Ray Spectrometry* Volume 32, Issue 5 , Pages 387-395.
25. **R. A. Barrea**, C.A. Pérez and H. J. Sánchez (2004), "Barium L subshells Coster-Kronig and fluorescence yields by the subshell selective photoionization method", *Nuclear Instrum. And Methods. In Phys Res. B*. 215 308–316.
26. Carlos A. Pérez, Héctor J. Sánchez, **Raúl A. Barrea**, Miriam Grenón, and José Abraham (2004), "Microscopic x-ray fluorescence analysis of human dental calculus using synchrotron radiation", *J. Anal. At. Spectrom.*, 19 (3), 392 – 397.
27. R. Fischetti, S. Stepanov, G. Rosenbaum, **R. Barrea**, D. Gore, R. Heurich, E. Kondrashkina, A.J. Kropf S. Wang, Ke Zhang, T.C. Irving and G.B. Bunker (2004), "The BioCAT Undulator Beamline 18ID: A facility for Biological Non-Crystalline Diffraction and X-ray Absorption Spectroscopy at the Advanced Photon Source", *J. Synchrotron Rad.* **11**, 399-405.
28. W.M. Heijboer, P. Glatzel, R.F. Lobo, U. Bergmann, **R. Barrea**, D.C. Koningsberger, B.M. Weckhuysen and F.M.F. de Groot (2004), "K β -detected XANES of framework substituted FeZSM-5 zeolites", *J. Phys. Chem. B* **2004**, 108, 10002-10011.

XX. PAPERS SUBMITTED OR IN PREPARATION

1. **Raul A Barrea**, Carlos A. Pérez, Tomás S. Plivelic, Edgardo V. Bonzi and Héctor J. Sánchez, (2004), "Anisotropic Angular distribution of Er L x-rays

following photoionization by linearly polarized radiation”, submitted to Phys. Rev. A.

2. **R. A. Barrea**, R. Fischetti, S. Stepanov, G. Rosenbaum, E. Black, D. Gore, R. Heurich, M. Vukonich, E. Kondrashkina, A.J. Kropf, S. Wang, K. Zhang, T.C. Irving and G.B. Bunker (2004), “**Biological XAFS at the BioCAT 18ID undulator beamline at the APS**”, accepted to be published at *Physica Scripta*.
3. P. Glatzel, F. M. F. de Groot, O. Manoilova, D. Grandjean, **R. Barrea**, U. Bergmann and B. M. Weckhuysen (2004), “Range-extended EXAFS at the L-edge of rare earths using high-resolution fluorescence detection: A study of La in LaOCl”, submitted to *Phys. Rev. Lett.*
4. Edgardo V. Bonzi and **Raúl A. Barrea** (2004), “Experimental L X-ray Fluorescence Cross Sections for Elements with 50 at 7 keV by Synchrotron Radiation Photoionization”, accepted for publication in *X-ray Spectrom.*
5. **R. A. Barrea**, C.A. Pérez and H. J. Sánchez (2004), “Coster–Kronig and L-subshell fluorescence yields of Yb, Ta, Re and W”, to be submitted.
6. **Raul A Barrea**, Carlos A. Pérez, Tomás S. Plivelic, Edgardo V. Bonzi and Héctor J. Sánchez (2004), “Anisotropic Angular distribution of Yb L x-rays following photoionization by linearly polarized radiation”, to be submitted.

XXI. PUBLISHED AND ACCEPTED PAPERS IN CONFERENCE PROCEEDINGS PEER REVIEWED (in Spanish).

1. **R.A. Barrea** and R.T. Mainardi (1987), "Determinación de espectros de tubos de rayos x detectando radiación dispersada a distintos ángulos", *Avances en Análisis por Técnicas de Rayos X*, 169-175.
2. **R.A. Barrea** and R.T. Mainardi (1990), "Dosímetro de radiaciones construido con centelladores plasticos", *Revista Brasileira de Engenharia Vol 7/ N1 pag 134-144.*
3. **R.A. Barrea** and R.T. Mainardi (1990), "Análisis por fluorescencia de rayos x de elementos con líneas superpuestas", *Avances en Análisis por Técnicas de Rayos X*, 74-79.

4. R.T. Mainardi and **R.A. Barrea** (1996), "Determinación de la emisión espectral de tubos de rayos x de anticátodo de tungsteno a partir de mediciones de intensidades fluorescentes de muestras puras", Avances en Análisis por técnicas en Rayos X, Vol VIII, 29-39.
5. **R.A. Barrea** and R.T. Mainardi (1996), "Desarrollo de un método absoluto de análisis por fluorescencia de Rayos X", Avances en Análisis por técnicas en Rayos X, Vol VIII, 41-49.
6. **R. A. Barrea**, R.T. Mainardi, P.A. Derosa and S. Bengió (1997), "Determinación de espesores en films delgados por análisis por fluorescencia de rayos-x", Avances en Análisis por Técnicas de Rayos X, Vol IX. pag 51-57.
7. **R. A. Barrea** and E. V. Bonzi (1997), "Determinaciones experimentales de secciones eficaces de fluorescencia de rayos-x L para tierras raras", Avances en Análisis por Técnicas de Rayos X, Vol IX. pag 218-223.
8. **Raúl A. Barrea** and Edgardo Bonzi (2000), "Sección eficaz experimental de producción de fluorescencia L en lantánidos a 15.22 keV", Avances en Análisis por Técnicas de Rayos X, Vol. X, 321-326.
9. Edgardo V. Bonzi and **Raúl A. Barrea** (2000), "Función analítica para el ajuste de líneas espectrales obtenidas con detectores de Germanio Hiperpuro", Avances en Análisis por Técnicas de Rayos X, Vol. X, 327-331.
10. **R. A. Barrea**, Edgardo V. Bonzi and Claudio Oviedo (2002), "Secciones eficaces de fluorescencia de rayos-x L para tierras raras con $64 \leq z \leq 70$ para energías de 9 a 14 kev", Avances en Análisis por Técnicas de Rayos-x, pg 169-174.
11. **R. A. Barrea**, V. Delgado Martínez and T. S. Plivelic (2002), "Análisis multielemental por FRX por parámetros fundamentales utilizando una descripción no explícita del haz de excitación", Avances en Análisis por Técnicas de Rayos-x, pg 117-122.
12. **Raúl Barrea**, Carlos Pérez, A. Ramos, Helio Tolentino, Héctor Jorge Sánchez, y Miriam Grenón (2002), "Incorporación de Zinc en Cálculos Dentales subgingivales", Avances en Análisis por Técnicas de Rayos X Vol. XI , 346-349.
13. **Barrea R. A.**, Vicentin F. C., Kawachi E. Y. y Bertran C. A. (2002), "Identificación de fases minerales en cálculos dentales por espectroscopía de absorción", Avances en Análisis por Técnicas de Rayos X Vol. XI, 350-354.

14. José Abraham, Miriam S. Grenón, Héctor J. Sánchez, Carlos A. Pérez and Raúl A. Barrea (2001), "Análisis espectroquímico de tartaro por fluorescencia de rayos-x con radiación sincrotron", Avances en Análisis por Técnicas de Rayos X Vol. XI, (2002).
15. Carlos Pérez, Héctor Jorge Sánchez, Raúl Barrea and Miriam Grenón (2002), "Estudio de la Distribución de elementos Mayoritarios y Trazas en Cálculos Dentales Humanos por Microfluorescencia de Rayos X con Luz de Sincrotrón", Avances en Análisis por Técnicas de Rayos X Vol. XI , 111-116.
16. J. Abraham, M. Grenón, H.J. Sánchez, C. Pérez, R. Barrea (2003), "Estudios de Composición Elemental y Estructural de Cálculo Dental Humano Durante sus Estadíos de Formación por FRX-RS", para ser publicado en Avances en Análisis por Técnicas de Rayos X Vol. XII.
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